

PATENT ABSTRACTS OF JAPAN

(11)Publication number : **06-064093**

(43)Date of publication of application : **08.03.1994**

(51)Int.CI. **B32B 15/08**

B29C 47/02

B29D 9/00

// B29L 9/00

(21)Application number : **04-235128**

(71)Applicant : **NIPPON STEEL CORP**

(22)Date of filing : **12.08.1992**

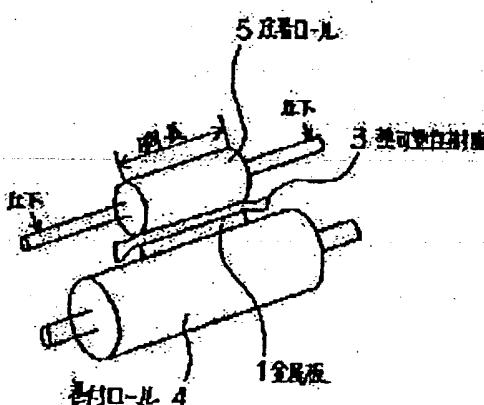
(72)Inventor : **FUNAKI MICHIIRO**

(54) MANUFACTURE OF LAMINATED METAL PLATE

(57)Abstract:

PURPOSE: To provide a method for manufacturing a thermoplastic resin coating metal plate having excellent adhesive properties, processability, corrosion resistance and external appearance with a high yield.

CONSTITUTION: A method for winding a metal plate 1 has the steps of bringing a press-bonding roll 5 into pressure contact with a metal plate 1 wound on a winding roll 4 and preheated, feeding melted thermoplastic resin 3 by a T die to a gap between the roll 5 and the plate through an extruder to coat the plate with the resin, and then cooling it, and comprises the steps of increasing a width of the flowing resin film 3 to larger than that of the plate 1, and setting a press-contact with of the roll 5 to the same as the width of the plate 1.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

MEANS

[Means for Solving the Problem] In order to lose an overcoat resin twisting and being pressed down of this invention by the roll by making pressure-welding width of face of a sticking-by-pressure roll the same as the width of face of a metal plate and not to stick it, it is the method that it twists and adhesion on a roll can be prevented.

[0020] this invention to namely, the preheated metal plate which was twisted around the roll with (1) volume In the method of carrying out the pressure welding of the sticking-by-pressure roll, flowing down the thermoplastics film fused from the T die through the extruder in the gap of a sticking-by-pressure roll and a metal plate, covering thermoplastics to a metal plate, and manufacturing a lamination metal plate While making larger than the width of face of a metal plate width of face of the thermoplastics film which flows down in the gap of a sticking-by-pressure roll and a metal plate, having it in the crosswise center section of the thermoplastics film and covering full [of a metal plate] The manufacture method of the lamination metal plate characterized by making pressure-welding width of face of a sticking-by-pressure roll the same as the width of face of a metal plate, [0021] (2) Carry out the pressure welding of the sticking-by-pressure roll to the preheated metal plate which was twisted around the roll with a volume. In the method of flowing down the thermoplastics film fused from the T die through the extruder in the gap of a sticking-by-pressure roll and a metal plate, covering thermoplastics to a metal plate, and manufacturing a lamination metal plate While making larger than the width of face of a metal plate width of face of the thermoplastics film which flows down in the gap of a sticking-by-pressure roll and a metal plate, having it in the crosswise center section of the thermoplastics film and covering full [of a metal plate] the manufacture method of the lamination metal plate characterized by adjusting the rolling force of a sticking-by-pressure roll to ends using the sticking-by-pressure roll which has a taper, and making it the pressure-welding width of face of a sticking-by-pressure roll become the same as the board width of a metal plate -- it comes out

[0022] Hereafter, this invention is explained in detail, referring to a drawing.

[0023] In this invention, a thick steel plate and a thick galvanized steel sheet, the zinc-alloy plating steel plate, a tin plated steel plate, a tin-alloy plating steel plate, an aluminum plating steel plate, an aluminium alloy plating steel plate, or a stainless steel board of board thickness

etc. is first used as a metal substrate from the use used for building materials, such as a roof, a wall, and a partition, the charge automobile material, the material of a high electrical-and-electric-equipment product, furniture, a can, etc.

[0024] Furthermore, what has an about 0.1-5micro chemical-conversion layer on this is contained.

[0025] In order that a chemical conversion may raise the corrosion resistance of a metal substrate, oxidation resistance, and adhesion, it is performed as surface treatment of a metal plate, and is performed by phosphoric-acid zinc processing, phosphoric-acid iron processing, or the electrolytic chromate treatment.

[0026] Furthermore, after not performing a chemical conversion or performing a chemical conversion, what has an adhesives layer on this is contained.

[0027] An adhesives layer is a layer which applied about several [at least]micro adhesives, in order to improve the adhesion of a metal substrate and thermoplastics.

[0028] As these adhesives, the adhesive thermoplastics which has functional groups, such as a denaturation polyethylene resin, a denaturation epoxy resin, and denaturation vinyl resin, is suitable.

[0029] Adhesion is good for the both sides of a metal and the thermoplastics used for covering, for example, in the case of a polyolefine covering steel plate, a denaturation polyolefine like an ethylene-vinyl acetate copolymerization resin or an ethylene-acrylic-acid copolymerization resin is suitable for these.

[0030] The thermoplastics used for covering by this invention For example, a polyethylene-terephthalate resin, Polyolefin resin, acrylic resin, polyester resin, polyamide resin, Vinyl chloride resin, a fluororesin, polycarbonate resin, a polystyrene system resin, ABS plastics, a chlorinated-polyether resin, a urethane resin, etc. are typical. to polyolefin resin There are a polymer or copolymers, such as ethylene, a propylene, 1-butene, and 1-pentene. as acrylic resin There are a polymer or copolymers, such as an acrylic acid, a methacrylic acid, an acrylic ester, methacrylic-acid ester, and an acrylamide. to polyester resin There are a polyethylene terephthalate, oil free polyester, etc. to polyamide resin There are the so-called Nylon 66, nylon 6, Nylon 610, Nylon 11, etc. to vinyl chloride resin There is a copolymer with vinyl acetate, others, for example, ethylene, etc., and there are a polytetraflouroethylene, a 3 ****-ized ethylene chloride resin, a 6 ****-ized ethylene propylene resin, ****-ized vinyl resin, ****-ized vinylidene resin, etc. in a fluororesin. [homopolymer]

[0031] Moreover, you may mix and use two or more resins. Moreover, the additive usually used at the time of film creation, for example, a degradation inhibitor, the modifier, the pigment, etc. may be included.

[0032] Moreover, in case it covers with a melting state, you may add cross linking agents, such as amino resin and an epoxy resin, in the range which does not lose a fluidity.

[0033] These thermoplastics is suitably chosen according to needs, such as weatherability, cold district aptitude, thermal resistance, scratch-proof nature, resistance to contamination, chemicals-proof nature, and deep-drawing processability, according to the use of a surface treatment metal plate. For example, a polyolefine is excellent in cold resistance, a polyamide is excellent in abrasion resistance, acrylic resin is excellent in resistance to contamination or chemicals-proof nature, and it is excellent [a fluororesin] in weatherability etc.

[0034] The polyethylene-terephthalate resin is especially useful for an acid-proof use.

[0035] Monolayer covering or multilayer covering of a homotypic or a different-species resin is sufficient as a resin. In multilayer covering (for example, a multilayer T die), it can carry out, and a glue line can also be prepared between layers.

[0036] At an interlayer thermoplastics in the upper layer for an adhesive resin to a lower layer for example, by the three-layer T die [the steel plate which is applying and preheating adhesives] [the thermoplastics in a melting state] It can extrude in the shape of a film, and the surface treated steel sheet which carried out multilayer covering directly and continuously

can be obtained. Or thermoplastics can be obtained in the 1st lower layer and the surface treated steel sheet which extruded thermoplastics in the shape of a film in the four-layer T die in the 4th best layer at the 3rd interlayer, and carried out multilayer covering of the adhesive resin directly and continuously can be obtained for the adhesive resin which is in the steel plate which is preheating at a melting state to the 2nd interlayer.

[0037] A drawing explains a manufacturing process below.

[0038] A metal substrate needs to precede covering a melting resin and it is necessary to preheat it.

[0039] For example, in the case of a polyethylene terephthalate, the preheating of -120 degrees C or more (therefore, about 135-255 degrees C) of melting points (255 degrees C) is desirable.

[0040] By carrying out a preheating, the fluidity of a resin increases and adhesion improves.

[0041] When, especially as for the time of a low, preheat temperature uses a cooling roller when not performing a preheating or, the adhesion of a resin is not enough and a result which lacks in corrosion resistance is brought.

[0042] Although the temperature of a preheating is so desirable that it is high since the fluidity of a resin increases, since a resin and adhesives will decompose if too high, it is not desirable. Moreover, it is not desirable from a viewpoint of energy saving.

[0043] Therefore, it is preferably carried out rather than the temperature of a melting resin below the temperature of a melting resin by 50-degree-C or more low temperature and the preheat temperature of about 50-230 degrees C of usual.

[0044] Drawing 1 carries out the pressure welding of the sticking-by-pressure roll 5 to the front face of the metal substrate 1 which twisted and was twisted around the roll 4 and which it preheated, flows down the thermoplastics 3 fused from T die 2 through the extruder to the interface of the metal substrate front face and sticking-by-pressure roll 5, and shows the lamination metal plate manufacture method of ****(ing) thermoplastics to the metal substrate 1.

[0045] Regulation of film ** or a surface state is easy for this method. For example, it is also easy regulation of surface gloss and to give an embossing pattern to a front face.

[0046] As for the metal substrate 1 with which the elevated-temperature melting resin 3 was covered, cooling *** is performed. Even if cooling may perform a water spray for example, after air cooling and it makes it pass through a water-cooled tub, you may let a cooling roller pass.

[0047] Drawing 2 twists with the sticking-by-pressure roll 5 in drawing 1, and is detailed explanatory drawing of the pressure-welding section with a roll 4.

[0048] While width of face of the thermoplastics film 3 which flows down near the interface of a metal plate 1 and the sticking-by-pressure roll 5 is made larger than the width of face of a metal plate 1 and the crosswise center section of the resin film covers full [of a metal plate] with this invention, pressure-welding width of face of a sticking-by-pressure roll is made the same as the width of face of a metal plate.

[0049] The thickness of the cross direction of the lamination metal plate which could take out by this the thick width-of-face portion of the both ends produced by the neck in (narrow ball) outside the metal plate, consequently was obtained is uniform, there is also no need for the trimming of a metal plate, and the product yield is good.

[0050] And adhesion on the roll with a volume of an overcoat resin can also be prevented, and it can stabilize and operate.

[0051] If what formed the taper in the both ends of drum length like drawing 3 as a sticking-by-pressure roll is used and you press down the shaft of ends, it is possible for a roll to carry out a bend, and for a flat part to be expanded, and to change the drum length of a pressure-welding portion substantially, and when manufacturing the metal plate which changed the board width, it is not necessary to exchange a sticking-by-pressure roll each time, and is

convenient.

[0052] It explains concretely via an example below.

EXAMPLE

[Example] After using the lamination metal plate manufacturing installation which used one pair of rolls with an outer diameter of 300mm and preheating this steel plate, using an electrolysis chromate-treatment steel plate with a thickness [of 0.2mm], and a width of face of 800mm as a metal plate, melting extrusion flowing down of the polyethylene terephthalate was carried out from the T die through the extruder at the interface with the roll with which the above-mentioned steel plate and the steel plate have not coiled.

[0054] It was cooled to ordinary temperature by the water spray, and the laminated steel plate was dried and rolled round. For 280 degrees C and covering thickness, 50micro and line speed are [resin temperature] 50mpm(s).

[0055] When overcoat resin width of face was every 30mm, it twisted, the drum length of a roll set to 1000mm and the drum length of ** sticking-by-pressure roll is made equal to the width of face of a metal plate.

** When the drum length of a sticking-by-pressure roll is made longer about 5mm than the width of face of a metal plate.

** When the taper was attached to the sticking-by-pressure roll, and the rolling force was adjusted, and it adjusted so that pressure-welding width of face may become the same as steel plate width of face even if the board width changed, it examined about three kinds of **.

[0056] In any case, operation nature was good, and it was able to obtain the lamination metal plate which has the outstanding performance with the sufficient yield.

[0057] ** For the level difference for board thickness, an overcoat resin also twists a case and don't stick it to a roll.

[0058] ** Although sticking-by-pressure roll exchange is required of ** whenever the board width changes, in **, a rolling force is adjusted, even if the board width changes, pressure-welding width of face can make it the same as steel plate width of face, and there is no need for exchange.

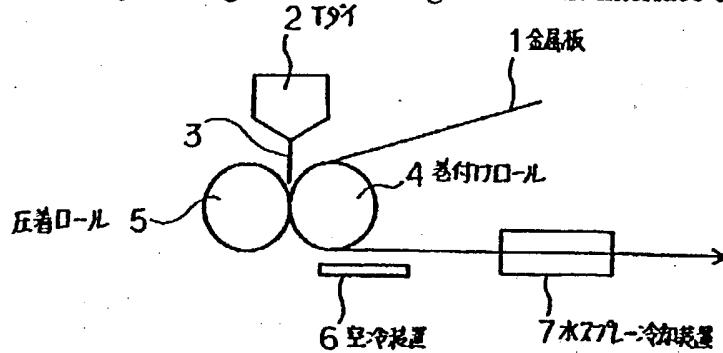
[0059] When the above-mentioned resin film was made more nearly equal than the width of face of a metal plate and it operated as an example of comparison, both ends needed to be trimmed for the ununiformity of covering thickness.

[0060] when the above-mentioned resin film is covered more greatly than the width of face of a metal plate and pressure-welding width of face of a sticking-by-pressure roll is made larger than the width of face of a metal plate, the resin covered from the metal plate to double width has twisted the steel plate -- it twisted, adhered and twisted around the roll, it coiled around the roll, and operation became impossible

DESCRIPTION OF DRAWINGS

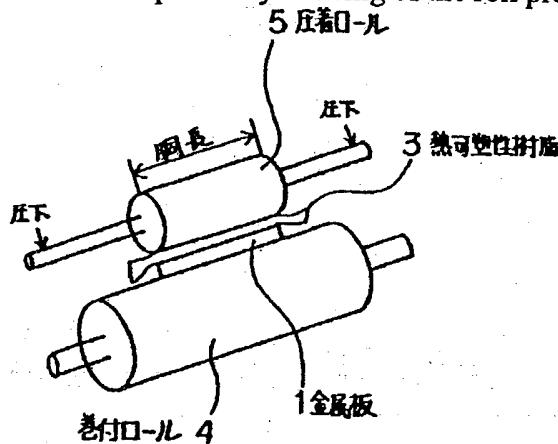
[Brief Description of the Drawings]

[Drawing 1] It is explanatory drawing of the invention-in-this-application method which covers by flowing down a melting resin to the interface of a metal substrate and a roll.

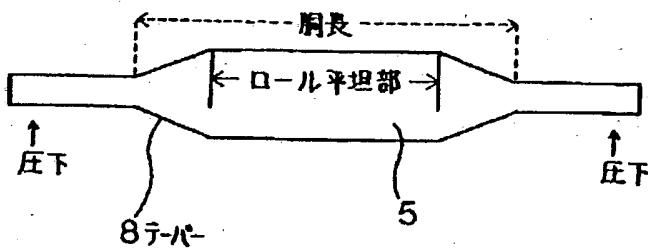


[Drawing 2]

Detailed explanatory drawing of the roll pressure-welding section in Drawing 1.



[Drawing 3] Explanatory drawing of the direction of the side of the sticking-by-pressure roll which has a taper to ends.



[Description of Notations]

- 1 Metal Plate
- 2 T Die
- 3 Thermoplastics
- 4 Twist and it is Roll.

- 5 Sticking-by-Pressure Roll
- 6 Cooling System
- 7 Water Spray Cooling System
- 8 Taper

This Page Blank (uspto)